Regional divergence and club convergence in India

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ABSTRACT

This paper examines regional divergence in income across different states in India, and estimates convergence clubs endogenously. The paper makes two useful contributions. First, the data is analyzed using a novel method due to Phillips and Sul (2007) leading to different conclusions in comparison to past studies, and secondly sectoral level data is employed which to our knowledge has not been employed in the literature before. Applying the novel approach to panel data relating to fifteen major states of India for the period 1968/69–2008/09, the results display significant divergence in per capita income across states at the aggregate and sectoral levels. There is also evidence of convergence clubs and variations in the number and composition of clubs across sectors. While three clubs are identified at the aggregate level, at the sectoral level we find three clubs in the industrial sector, two clubs are identified in both the agriculture and services sectors. The final part of the paper deals with the policy implications.

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1. Introduction

Since independence, the Indian government has been concerned about how to strengthen national unity and promote economic growth with regional equality. Redressing regional imbalances has been one of the primary objectives of the Indian planning. It has been given sharp focus in all the plans, and the concern for regional disparities in development has been expressed in government's policies and programs. The Eleventh Five-Year Plan (2007–12) has chosen 'faster and more inclusive growth' as its central theme, recognizing the need to make growth 'more inclusive' in terms of benefits of growth flowing to those sections of population, which have been bypassed by high rates of economic growth achieved in recent years. It has also been perceived that disparities among regions have been increasing steadily and the benefits of growth have not reached all parts of the country in an equitable manner. Hence, for growth to be 'more inclusive' regionally, it is necessary that the benefits of growth be shared equally by all the regions of the country. In the present juncture of the economy's rapid growth, it is useful to investigate how far economic growth has been 'inclusive' regionally, and how the benefits of growth have been shared by different regions of the country.

A large number of studies on regional economic growth and disparity in India are available (see, for example, Cashin and Sahay, 1996a,

1996b; Nagaraj et al., 1998; Sachs et al., 2002; Trivedi, 2002; Baddeley et al., 2006; Ghosh, 2008; Bandyopadhyay, 2011). Most of the studies find that regional divergence in per capita income has been increasing, and absolute convergence has not occurred in India. The absence of absolute convergence in the entire sample of states could be due to that the states belong to different equilibrium, and converge to different steady states[1] due to differences in initial conditions. In the presence of multiple equilibria, it would be proper to identify subset of states whose members share the same steady state and to check whether convergence holds within these groups. This suggests the need to examine the existence or otherwise of convergence clubs among states. However, very little work was done for clustering of income data into convergence clubs and classifying the Indian states into different groups.

In this context, recent work by Baddeley et al. (2006) and Bandyopadhyay (2011) focus on the question concerning the different steady states to which the Indian states approach, and how different are these steady states. For example, Baddeley et al. (2006) provide empirical evidence over sample between 1970 and 1997 that suggests the overall divergence of income across the states in India. According to Baddeley et al. (2006), there is little evidence of conditional convergence, in which the Indian states converge to different steady states and that the convergence club hypothesis, as described by Chatterjee (1992) does not hold. Bandyopadhyay (2011), on the other hand, argue that income and growth across states have

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[1] We use the terms equilibrium and steady state interchangeably.

polarized into two income convergence clubs, namely, a rich states and a poor states club in the spirit of Quah's (1997) twin peaked distribution and mobility of income. Bandyopadhyay's (2011) main finding is that incomes across states between 1965 and 1997 have moved to a bimodal income distribution with two peaks in which the middle-income states moved to either the rich states peak or poor states peak. Despite the different approaches, the above studies allow the possibility of a maximum of two clubs of convergence and hence two steady states.

The methodology most commonly utilized for studying regional convergence in India is based on the growth-convergence equation (Barro and Sala-i-Martin, 1992, 1995; Sala-i-Martin, 1996; Mankiw et al., 1992) derived formally from the neoclassical growth model (Solow, 1956; Swan, 1956). There are, however, several shortcomings of this methodology. Most serious one is that a negative β-coefficient, implying absolute β-convergence, may be consistent with a stable or rising variance in per capita output across regions. Moreover, in the presence of multiple equilibria, this approach tends to reject the null hypothesis of no convergence too often (Bernard and Durlauf, 1996). It has been demonstrated that data generated by a cross-section of regions exhibiting multiple steady states may exhibit statistical convergence. However, statistical convergence in the presence of multiple steady states is inconsistent with the economic notion of convergence (Azariadis and Drazen, 1990). Durlauf (2003) argues that a problem of the convergence methodology is the failure to develop tests of convergence hypothesis that differentiate between convergent economic model and a set of non-converging alternatives, and the statistical convergence may be consistent with economic non-convergence. Moreover, since the cross-sectional convergence regression requires strong homogeneity assumption, empirical studies based on such regression could provide misleading results, if the growth processes are heterogeneous and non-linear.

A less commonly used approach to study income convergence in India is stochastic convergence. The concept of stochastic convergence, although is not widely used in income convergence, has been a popular concept in environmental economics and the literature of convergence of CO_2 emissions. A large number of studies can be found including — among others — Strazicich and List (2003), Barassi et al. (2008, 2011) and Westerlund and Basher (2008). The concept of stochastic convergence is tested via testing for the hypothesis of unit roots. In this context, the presence of unit roots implies that shocks to the process under consideration are permanent and hence non-convergent, while stationarity implies that shocks are temporary and the process is said to be stochastically convergent.

The studies dealing with convergence club involve limitations due to the shortcomings of the methodologies used to identify subsets of regions. For example, the methodology of Baddeley et al. (2006) does recognize the idea of clubs of convergence. The idea, however, is defined along the lines of the presence of one single long run steady state, defined by the absolute convergence. Thus, it rules out the possibility of the states, forming a club of divergence, to converge to different steady states. Furthermore, testing clubs of convergence using Quah (1997), as in Bandyopadhyay (2011) is based on informal inspection of per capita income distributions, which might miss out some potential clubs at the two ends of the distribution.

Moreover, the concept of stochastic convergence implies that there is one equilibrium to which the time series being tested converge and consequently one club of convergence. One exception that might lead to the case of clubs of convergence is when there is a mix of stationary, I(0), and nonstationary, I(1), time series. This case is similar to Chatterjee (1992) approach to clubs of convergence, which states that there is one steady state to which rich states converge (I (0) time series) and hence form a convergence club, while the poor states (I(1) time series) move away from it and form a club of divergence. This is, however, a restricted form of clubs of convergence since one might argue that rich states may not share the same steady state and consequently form more than

one club of convergence. Furthermore, divergence club is formed by the states that do not converge to the equilibrium, while this might suggest that these states may be convergent to other equilibria the approach in use cannot identify. Furthermore, unit root tests employed in stochastic convergence literature suffer from low power due to ignoring the possibility of the presence of structural breaks (as argued by Perron (1989) in the context of a single time series and Im et al. (2005) in panel data framework) or because they do not exploit information about the presence of breaks as shown by Kim and Perron (2009).

Thus, appropriate non-linear specifications will have to be used to study club convergence. In this context, Phillips and Sul (2007) provide a novel approach that relaxes the assumption about the stationarity of the time series and defines a concept of convergence and clubs of convergence that is broader than that introduced in Quah (1997), Chatterjee (1992) and the literature of stochastic convergence.

Applying Phillips and Sul (2007) approach to panel data relating to fifteen major states of India for the period 1968/69–2008/09, this paper examines regional divergence in income across states, and estimates convergence clubs endogenously. This paper is complementary to the above studies in a number of ways. First, we use extended data sets of income across states in India, covering the period mentioned above. Second, in addition to investigating convergence of income at the aggregate level, we further consider convergence at the sectoral level. Indeed, this is a significant contribution to the literature, since no attempt was made to study the convergence hypothesis at the sectoral level, and this could be useful in guiding policies for achieving regional balance. Finally, we apply the Phillips and Sul (2007) approach, which allows modeling and analyzing economic transition behavior under the presence of common growth characteristics in a way that is compatible with the neoclassical approach. This approach has a number of attractive econometric features that help in testing the overall absolute convergence of income across states; it provides a procedure for identifying clubs of convergence endogenously in a very simple and convenient time series regression test for convergence. The concept of convergence club suggested by this approach is more general in the sense that it is not restricted to just whether a state converge to a common steady state or not (as in Chatterjee (1992) and Baddeley et al. (2006)) or two clubs — one for rich states and another for poor states (as in Bandyopadhyay (2011)); it also includes the possibility of mobility and catching up. This approach allows for clustering the states depending on their individual transition path relative to common trend, which may lead to identifying steady states describing the level of income to which states of the similar time path converge.

The rest of the paper is organized as follows. Section 2 outlines the method of estimation. Section 3 describes the data and the properties of income of the states. The empirical results are discussed in Section 4. Section 5 summarizes the main findings and draws conclusions.

2. Econometric methodology

Various studies such as Chatterjee (1992), Chatterjee and Dewhurst (1996) and Quah (1997) proposed different ways and approaches of estimating convergence clubs. Very recently, Phillips and Sul (2007a), PS hereafter, introduce a novel approach to test for convergence and to identify convergence clusters endogenously. The PS approach proposes an idiosyncratic element that is allowed to evolve over time and capture heterogeneity across individual using a time varying factor-loading coefficient. The test implemented in this approach does not rely on any particular assumption concerning trend stationarity or stochastic non-stationarity of the variable of interest and the common factors across individuals in the panel, which makes it very attractive and solves the issue of unit roots and cointegration when dealing with convergence in time series panel framework.